

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Unlicensed Use of the 6 GHz Band)	ET Docket No. 18-295
Expanding Flexible Use in Mid-Band Spectrum)	
Between 3.7 and 24 GHz)	GN Docket No. 17-183

COMMENTS OF GE HEALTHCARE

I. INTRODUCTION.

GE Healthcare (“GEHC”) hereby submits the following comments in response to the Notice of Proposed Rulemaking (“NPRM”) issued by the Federal Communications Commission (“FCC” or “Commission”) in the above referenced proceedings.¹ The NPRM seeks comment on expanding unlicensed use in the 5.925-6.425 GHz (U-NII-5), 6.425-6.525 GHz (U-NII-6), 6.525-6.875 GHz (U-NII-7), and 6.875-7.125 GHz (U-NII-8) bands (altogether, the “6 GHz band”).

As explained below, GEHC applauds the Commission’s initiative to identify more spectrum that is suitable for unlicensed use. Healthcare professionals have developed a wide array of innovative technological solutions to meet the country’s growing healthcare needs, including solutions that rely on unlicensed spectrum. However, as the country’s healthcare needs rise, the healthcare industry must turn to new solutions that can work in conjunction with existing applications to maximize limited financial and spectrum resources and meet that demand. By allowing unlicensed use in the 6 GHz band as described below, the FCC can help ensure that these innovative healthcare solutions have the spectrum resources they need to deliver cutting-edge care to patients.

¹ *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, FCC 18-147 (rel. Oct. 24, 2018) (“NPRM”).

II. THE U.S. HEALTHCARE INDUSTRY HAS BEEN A DRIVING FORCE IN THE DEVELOPMENT OF WIRELESS TECHNOLOGIES.

The U.S. healthcare industry has developed and deployed a wide array of wireless-enabled devices that improve healthcare delivery, medical facility resource administration, and patient outcomes. For example, wireless patient monitoring devices increase patient comfort and mobility, provide healthcare professionals with real-time patient data, allow seamless intra-hospital transfers, and reduce the time medical professionals spend setting up and troubleshooting equipment.² Real-time wireless monitoring also increases work shift flexibility, allowing for more efficient allocation of increasingly limited medical staff resources.³ These are just some of the benefits realized through the healthcare industry's development of innovative wireless applications.

Innovative wireless technologies allow healthcare professionals to maximize resources and meet the increasing healthcare demands of the nation. On average, 40 to 70 percent of patients in U.S. hospitals' inpatient departments are physically transferred each day.⁴ Wireless patient monitoring systems lower the risk of infection during these transfers and reduce the time spent by healthcare professionals on such activity by more than 30 percent.⁵ The resource savings and efficiency gains for medical professionals are potentially massive, considering the fact that 36,510,207 patients were admitted to U.S. hospitals in 2017.⁶ At one hospital in which more than 10,000 patients were tracked, researchers tallied 34,715 total intra-hospital transfers in

² See, e.g., "Agency for Healthcare Research and Quality: Frequently Asked Questions," AHRQ, United States Department of Health and Human Services, <https://bit.ly/2UbG5i6>.

³ Juan M. Corchado et al., "GerAmi: Improving Healthcare Delivery in Geriatric Residences," *Journal of IEEE Intelligent Systems*, Special Issue on Ambient Intelligence vol. 3, no. 2 19-25 (2008), <https://bit.ly/2FY51WF>.

⁴ Joanna Abraham and Madhu C. Reddy, "Challenges to inter-departmental coordination of patient transfers: A workflow perspective," *International Journal of Medical Informatics* 79, 112-22 (2010).

⁵ *Id.*

⁶ The American Hospital Association, "2017 AHA Annual Survey," <https://www.aha.org/system/files/2019-01/2019-aha-hospital-fast-facts.pdf>.

one year, which equates to an average of 2.4 transfers per patient.⁷ On average, the patient transfers took 42 minutes and the bed transfers took 11 minutes of nurse time.⁸ Based on the frequency of patient moves, 11.3 full-time equivalent nurses were needed to move patients within the site hospital each month. Nurses at the site hospital spent over 1,700 hours each month on activities associated with transferring patients, which left less time for nursing care.⁹ Wireless patient monitoring systems allow hospitals and healthcare professionals to focus on delivering the highest-quality care, rather than wasting time repeatedly setting up and disassembling monitoring equipment.

In particular, Wireless Medical Telemetry Service (“WMTS”) and Medical Body Area Network (“MBAN”) technologies stand out as examples of wireless innovation in the healthcare industry. GEHC is the nation’s largest provider of WMTS devices, which play a pivotal role in patient monitoring and detection of life-threatening events.¹⁰ The FCC has observed that WMTS offers patients “significant benefits . . . in terms of mobility and comfort” and represents a “significant tool” to reduce healthcare costs for patients and providers.¹¹

MBANs, another wireless medical technology being developed by GEHC, increase patient comfort, enable comprehensive patient monitoring, reduce the risk of infection, and maximize limited resources for healthcare professionals.¹² In its *MBAN Order*, the FCC recognized that wireless medical applications “could save countless lives and reduce nationwide

⁷ Nicole Blay, “Intrahospital Transfers and the Impact on Nursing Workload,” *Journal of Clinical Nursing*, 2017;26:4822–4829 (Apr. 5, 2017), <https://doi.org/10.1111/jocn.13838>.

⁸ *Id.*

⁹ *Id.*

¹⁰ Comments of GE Healthcare, GN Docket No. 16-46, at 2 (May 24, 2017) (“*Telehealth Comments*”).

¹¹ *Amendment of Parts 2 and 95 of the Commission’s Rules to Create a Wireless Medical Telemetry Service*, Order, 16 FCC Rcd 4543 ¶ 2 (2001).

¹² Comments of GE Healthcare, ET Docket No. 08-59, at 4 (May 27, 2008).

health care expenses by billions of dollars. Put simply, the MBAN concept demonstrates the power of new communications technologies to improve and advance the state of health care.”¹³ MBAN and WMTS, both of which rely on licensed spectrum, continue to revolutionize critical patient care and safety-of-life monitoring.

In addition to developing licensed wireless applications, the healthcare industry drives innovation through the use of unlicensed spectrum. GEHC, for example, offers dozens of Wi-Fi-enabled devices that operate in hospitals. Our Carescape line of monitors and sensors allow intra-hospital transfers without the need to disconnect and reconnect equipment.¹⁴ Our Novii Wireless Patch System monitors and transmits fetal and maternal diagnostic data for patients during labor.¹⁵ Our MobileLink wireless ECG increases monitoring efficiency, reduces data errors, and enhances security for wireless transmission of sensitive patient data.¹⁶ And the benefits extend beyond patient care to resource tracking and improved hospital administration. For example, our Encompass system uses Bluetooth Low Energy to enable real-time location tracking for hospital inventory.¹⁷ All of these unlicensed systems contribute to greater efficiency for hospitals and medical facilities, while providing myriad benefits to patients themselves.

In short, the healthcare industry has proven time and again that it is capable of realizing the many benefits envisioned by the FCC and enabling a wide array of innovative applications that advance the public interest. By increasing the availability of unlicensed spectrum for

¹³ *Amendment of the Commission’s Rules to Provide Spectrum for Operations of Medical Body Area Networks*, Order on Reconsideration and Second Report and Order, 29 FCC Rcd 10662 ¶ 1 (2014) (“*MBAN Order*”).

¹⁴ GEHC, Patient Monitoring Portfolio, <https://www.gehealthcare.com/en/products/patient-monitoring>.

¹⁵ GEHC, Novii Wireless Patch System Product Brochure, <https://bit.ly/2RMjXhF>.

¹⁶ Silex Technology, Case Study: GE Healthcare – MobileLink Wireless ECG Communication, <https://bit.ly/2AZMshn>.

¹⁷ “GE Healthcare Debuts Wireless Asset Tracking Technology,” 24x7 Magazine, June 15, 2017, <https://bit.ly/2FJjITk>.

healthcare use as described below, the Commission would be taking an important step to unleash the tremendous potential of next-generation wireless healthcare applications.

III. OPENING THE 6 GHZ BAND FOR UNLICENSED USE WILL HELP ALLEVIATE CONGESTION AND PROMOTE FURTHER INNOVATION.

The Commission has consistently recognized the growing need for spectrum to support advanced healthcare devices and services. In April 2017, for example, the Commission sought comment on how it could support the adoption and accessibility of broadband-enabled healthcare solutions, expressly seeking information about “the future spectrum and wireless infrastructure needs in the health care sector.”¹⁸ GEHC and others have emphasized that demand for spectrum to support advanced healthcare applications continues to surge, “noting trends towards fully connected hospitals, widespread remote patient monitoring, and [the need to leverage] connectivity to improve health facilities’ workflow and back-office functions.”¹⁹ However, unlicensed use has continued to grow at a breakneck pace, increasing the likelihood of interference on congested airwaves. Indeed, spectrum congestion is already occurring in hospitals and negatively affecting the reliability of their systems.²⁰

Opening up the 6 GHz band to unlicensed use can help address this growing need and alleviate congestion. Not all healthcare applications require the same protection from

¹⁸ *FCC Seeks Comment and Data on Actions to Accelerate Adoption and Accessibility of Broadband-Enabled Health Care Solutions and Advanced Technologies*, Public Notice, 32 FCC Rcd 3660, at 14 (2017) (“*Telehealth PN*”) (noting the Commission’s “long history of addressing spectrum needs for the development of next-generation health technologies and medical devices, and of exercising flexibility . . . in revising its rules and policies to speed up their deployment.”).

¹⁹ *Telehealth PN* at 13; *see also, e.g.*, Meredith Attwell Baker, President and CEO, CTIA-The Wireless Association, Keynote Address at Broadband Health Summit (Oct. 1, 2015), <https://bit.ly/2QxUi6T> (calling on the FCC to allocate more spectrum for health-related services); *Telehealth Comments* at 2 (explaining that the number of healthcare facilities that rely on wireless patient monitoring “is expected to increase significantly as hospitals and others adopt to an aging U.S. patient population and increased patient acuties”); Comments of New England Telehealth Consortium, GN Docket No. 16-46, at 3 (May 24, 2017) (highlighting the dramatic increase in bandwidth demand for telehealth applications).

²⁰ *See, e.g.*, H. Stephen Berger and H. Mark Gibson, “The Wireless Challenge: Managing Your Hospital RF Spectrum,” *Biomed. Instrumentation Technol.*, vol. 47, no. 3, pp. 193–197, 2013, <https://bit.ly/2Hr8XBx>.

interference as licensed healthcare services such as WMTS. These other applications can offer substantial efficiency gains for healthcare providers and improve patient experiences while operating on unlicensed spectrum. Meanwhile, mid-band spectrum is a “sweet spot” for healthcare applications with greater throughput demands, such as high-resolution imaging transfers, because the frequencies at that range are low enough to cover large areas but offer greater bandwidth to support high-capacity services.²¹ By opening up the 6 GHz band for unlicensed use, the Commission can help ensure that these next-generation healthcare applications have the capacity and throughput necessary to reach their full potential.

Finally, having more available unlicensed spectrum will better allow hospitals to use improved frequency separation techniques for medical and non-medical devices that use Wi-Fi. Frequency, or channel, separation allows systems that rely on the same unlicensed spectrum to co-exist without harmful interference. However, as unlicensed uses grow, the options for frequency separation will become more and more limited. By opening up more spectrum for unlicensed use, the FCC would increase the number of potential frequencies that are available for hospital device operations, which will reduce the risk of interference.²² For example, a hospital could use frequency separation to create segmented zones and operate wireless systems on different channels within those zones. However, the ability to do so is currently constrained by the availability of non-overlapping channels. For example, only three non-overlapping Wi-Fi channels are available in the 2.4 GHz band. Opening up the 6 GHz band for unlicensed use will enable more flexible frequency separation techniques that increase the reliability of Wi-Fi in hospitals by greatly reducing congestion and increasing capacity.

²¹ See, e.g., NPRM ¶ 59 (noting that the Commission’s proposal to allow unlicensed use in the 6 GHz band would support high throughput applications); Comments of Wi-Fi Alliance, GN Docket No. 14-177, at 4 (Sept. 11, 2018).

²² See, e.g., S. Kawade and T.G. Hodgkinson, “Analysis of Interference Effects between Co-Existent 802.11b and 802.11g Wi-Fi Systems,” 1881 - 1885. 10.1109/VETECS.2008.427 (2008), <https://bit.ly/2sKOUNC>.

IV. AS THE COMMISSION ACTS TO FREE UP UNLICENSED SPECTRUM IN THE 6 GHZ BAND, IT SHOULD ENSURE THAT EXISTING SERVICES ARE PROTECTED FROM HARMFUL INTERFERENCE.

GEHC recognizes the importance of protecting existing services in the 6 GHz band and, as in past proceedings, recommends a holistic, data-driven approach that contemplates real-world conditions.²³ The FCC attempted in 2015 to protect hospitals' use of television channel 37 ("Channel 37") for WMTS, vowing to be "conservative in [its] determination of protection distances to protect WMTS" in light of "the importance of WMTS to patient care."²⁴ Although the FCC's good intentions were to protect WMTS, adequate protection was not provided, as GEHC and others have explained.²⁵ For example, in establishing rules for unlicensed devices, the FCC used a methodology to determine WMTS separation distances that failed to account for real-world WMTS antenna design and system deployments, incorporated height above average terrain ("HAAT") in a way that leads to absurd results in many cases, and ignored the potential for multiple interferers.²⁶

To protect incumbent operations while promoting unlicensed uses in the 6 GHz band, GEHC supports the following policies: (1) allow low power, indoor-only operations throughout every sub-band comprising the 6 GHz band without automatic frequency control ("AFC") requirements; (2) allow standard-power operations in the U-NII-8 band so long as AFC technology is used; and (3) allow client devices that operate under the control of a standard power or low power access point ("AP") to match AP power levels. Allowing low power,

²³ See, e.g., NPRM ¶ 16; GEHC Comments, ET Docket No. 14-165, GN Docket No. 12-268 (Feb. 4, 2015) (discussing the results of real-world interference and path-loss tests).

²⁴ *Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, et al.*, Report and Order, 30 FCC Red 9551 ¶ 202 (2015).

²⁵ See, e.g., GEHC, Petition for Reconsideration, ET Docket No. 14-165, GN Docket No. 12-268 (Dec. 23, 2015).

²⁶ *Id.* at 2-5.

indoor-only operations throughout the 6 GHz band without AFC requirements – which likely are unnecessary given the low potential for interference from such operations to incumbent users – will simplify device development and qualification.²⁷ The Commission should, however, require AFC to avoid interference, where necessary. For instance, AFC is likely appropriate for standard power operations in the U-NII-8 band. Finally, allowing equal power levels for client devices and controlling APs will help prevent asymmetric radio frequency links without posing a significant threat of interference.²⁸ By incorporating these policies into its framework, the Commission can better promote unlicensed use of the 6 GHz band while ensuring that incumbent services remain protected from harmful interference.

V. CONCLUSION.

The healthcare industry has been a driving force for wireless innovation and is poised to develop the next-generation of wireless technologies. As the foregoing comments demonstrate, allowing unlicensed use in the 6 GHz band will spur medical device innovation, reduce strains on medical facilities and their staffs, and lead to better patient health outcomes.

²⁷ See, e.g., Letter of Alex Roytlat, Senior Director of Regulatory Affairs, Wi-Fi Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183, at 4 (filed Sept. 18, 2018) (“Since these devices operate at low-power levels with their signals further attenuated by structure shielding they present minimal potential for interference.”).

²⁸ See ITU Report M.2292.

Respectfully submitted,

/s/ Ari Q. Fitzgerald

Mathew Pekarske
GE Healthcare
8200 W. Tower Avenue
Milwaukee, WI 53223

Ari Q. Fitzgerald
Wesley B. Platt
Hogan Lovells US LLP
555 Thirteenth Street, NW
Washington, DC 20004
Phone: (202) 637-5663

Counsel to GE Healthcare

February 15, 2019